

Rio Tinto

Rio Tinto Kennecott
On Behalf of Kennecott Barneys Canyon Mining Company
4700 Daybreak Parkway
South Jordan, Utah 84095
801-569-7128 (o)
801-569-7192 (f)

Chris Kaiser
Acting Manager - Environment

16 April 2014

VIA HAND DELIVERY

Mr Paul Baker, Minerals Program Manager
Division of Oil, Gas & Mining
Utah Department of Natural Resources
P.O. Box 145801
Salt Lake City, Utah 84114 - 5801

Subject: Written Notification of Off-Site Deposition of Sediment

Dear Mr. Baker:

Kennecott Barneys Canyon Mining Company ("Barneys") submits the following information in response to the "Division Directive" dated 9 April, 2014. The directive requested a summary table of the release event with an adequate map. By responding to the Division Directive and submitting the following information, Barneys is not waiving, and does not waive, any rights or defences it may have to object to, refute, or otherwise challenge the issuance of the Division Directive, any statement or allegation, in the Division Directive, for any future action that the Division may take in response to the release of sediment reported on 28 March 2014 or any information submitted by Barneys in response to the Division Directive. In fact, Barneys expressly reserves any and all rights, defenses, and objections it may have to challenge the Division Directive or any future Division action.

Summary of Events

As part of closure characterization work for the Barneys Canyon mining operation, preliminary field instrument readings indicated potentially elevated levels of arsenic in soil/sediment material used to level the sulphide processing plant pad. Further characterization was initiated to determine if the elevated levels existed on other locations of the property.

As part of the additional soil characterization it was noted that material in the bottom of the Clay Hallow drainage also contained elevated levels of Arsenic. On 25 March 2014 preliminary field instrumentation data indicated elevated levels of Arsenic off the Barneys mine site and in Clay Hallow as far east as the Kennecott Utah Copper tailings lines, but the levels appeared to be decreasing as the characterization crews travelled east. Characterization technicians were instructed to continue characterization to the east in an effort to understand the extents of the material.

On 28 March 2014, the same field instrument indicated elevated levels of Arsenic at the eastern boundary of the Kennecott property line leading Barneys personnel to suspect the soil/sediment had been transported by stormwater offsite to the drainage area owned by West Jordan City, located west of Highway 111 and north of the Sycamores subdivision, as shown in the attached Figure 1. A field sample was also taken and sent to the Kennecott Environmental Lab (KEL) to obtain official characterisation results; which would not be available for one to two business days. Taking into account the delay in lab results and in an effort to ensure Barneys was adequately protecting public health, two additional hand-held instruments were brought in to characterize the material and verify the accuracy of the first instrument. Upon receiving similar readings from the two additional instruments it was determined that the preliminary data was sufficient information to alert governing agencies; therefore a call was placed to the DEQ environmental hotline to report the findings.

RECEIVED

APR 21 2014

DIV. OF OIL, GAS & MINING

M103510009

Leslie

Mike

Peter

6042

RECEIVED

APR 21 2014

DIV. OF OIL, GAS & MINING

As confirmation screenings were being made on 28 March 2014, source control measures were also initiated to reduce the potential for sediment to leave both the general Barneys property and Kennecott property..

On the morning of 29 March 2014, Leslie Hepler (DOGM) and Doug Bacon (DERR) were both notified of the potential offsite release of deleterious material on to West Jordan property. At this same time notification was made to the city of West Jordan of the event and a request was made to access the property. With access approval, installation of a temporary six-foot chain-link fencing began, guided by handheld screening instrumentation, as a measure to protect the health and safety of the community by decreasing possible exposure. Initial source control measures were completed and included plugging the first culvert in Clay Hallow below the Barneys property line, installing silt fence at the Kennecott/ West Jordan property line, and installing silt fencing in the upstream culvert and drainage systems located on Rio Tinto property. Additionally, all drainages west of the Sycamores subdivision were preliminarily characterized for arsenic. These characterization efforts indicated that the release was confined to the Clay Hallow drainage.

At 11:30 AM, 30 March 2014 installation of the temporary fencing was finished and preliminary characterization showed the material had not left the West Jordan property.

On 1 April 2014, lab results from the sample collected at the Kennecott / West Jordan property line confirmed preliminary readings and additional field characterization of the offsite material began. Also, with Regulatory and West Jordan City approvals, notification was made to the residents of the Sycamores subdivision alerting them of the material and plans for future remediation.

Additional source control measures have been implemented and include evaluating and grading roadways and surface drainage systems to direct flow into onsite catchments, and ensuring all other drainages exiting Barneys property are plugged.

Currently the events contributing to the release of the material are still under investigation; therefore, information is limited. Rio Tinto offers to remain in ongoing dialog with the Division regarding details as they are available.

Timeline for Cleanup

Barneys submits the following information in response the "Division Directive" requesting a timeline for cleanup of the drainage affected from the offsite release reported 29 March 2014.

Table 1 attached identifies activities that Barneys has or will be initiating to 1) Construct desilting basins above the Kennecott property line 2) Cleanup of the offsite material from the West Jordan property in Clay Hallow (segment 1) 3) Restore the West Jordan property stormwater controls to a similar state as before the release 4) Seeding of the disturbed portions of the West Jordan Property 5) Cleanup of the material from Clay Hallow between the Barneys Canyon / Kennecott property line and the Kennecott / West Jordan Property Line (segments 2-4) and 6) Seeding of the removal area between Barneys Canyon / Kennecott property line and the Kennecott / West Jordan Property Line. Work areas are indicated on Table 1 and are depicted by color coding on Figure 1. Figure 1 also indicates the disposal location of material that is being removed Clay Hallow.

Barneys has indicated completion targets for each activity in Table 1. These targets are based on best judgement with the information available at the time. For some activities, sufficient information is lacking to estimate a reasonable target completion date. Actual completion dates may vary due to adverse ground conditions, contractor availability, external approvals and other factors. Barneys will use reasonable effort to meet the completion timelines and will promptly inform the Division of significant schedule changes.

Barneys will provide monthly reports to the Division in tabular format indicating progress on each activity and updated estimates of completion. Barneys proposes to provide the first monthly report on May 15 and on the 15th of each month.

Cleanup Plan

A cleanup plan for the West Jordan property (Segment 1), consistent with DERR requirements, has also been attached. This plan outlines the manner in which soils will be characterized, the Arsenic concentration levels which will guide the removal, the practices that will be used to control worker and public expose as well as the Quality Assurance and Quality Control procedures for the project. Upon approval of the plan, construction activities will begin shortly. An additional cleanup plan of the area between the Barneys Canyon / Kennecott property line and the Kennecott / West Jordan Property Line will be developed and submitted to the division before cleanup activities transition from the West Jordan property.

Please contact Thiess Lindsay (801-569-6066) should you have any questions concerning this written follow-up. Thank you and your staff for your continued cooperation.

Regards,



Chris Kaiser
Acting Manager - Environment

cc: Dan Hall (DWQ)

cc: Doug Bacon (DERR)

Table 1 Cleanup Response Activities

ID	Work Area	Activity	Planned Target		Status	Comments
			Start	Finish		
1A	Segment 1	Additional sampling on the West Jordan property	4/1/2014	5/16/2014		The distribution of mine waste sediment shall be based on visual observation, XRF analysis of soils for arsenic and lead, and laboratory analysis on select confirmation samples for arsenic and lead.
1B	Segment 1	Draft a Characterization/Removal work plan	4/1/2014	4/17/2014		Plan provided as dictated in the DOGM Division Directive
1C	Segment 1	Site visit with DWQ, DOGM and DERR	4/9/2014	4/9/2014		Allow regulators an opportunity to see the site in person and ask questions.
1D	Segment 1	Regulatory review of Cleanup Plan - Segment 1	4/18/2014	4/21/2014		Submission of joint review between the three agencies
1E	Segment 1	Obtain Regulatory approval of Cleanup Plan - Segment 1	4/21/2014	4/21/2014		Regulatory approval shall include action levels for arsenic, excavation and removal of material, transportation of material, final deposition of removed material, and restoration of the drainage.
2A	Segment 1	Increase desilting capacity at the Kennecott property line	4/22/2014	4/28/2014		Initial step is to prevent additional mine waste sediment from migrating off Rio Tinto property.
2B	Segment 1	Remove sediments from - Segment 1	4/22/2014	5/9/2014		The removal of mine waste sediment will commence just downstream of the desilting basins that are to be constructed. From this point the removal will continue downstream to the property line, thus preventing further migration of mine waste sediment off of Rio Tinto property.
1F	Segments 2-4	Submission of Cleanup plan for - Segments 2 - 4	5/9/2014	5/9/2014		Plan provided as dictated in the DOGM Division Directive.
2C	Segment 1	Reconstruct riprapped channel in - Segment 1	5/12/2014	6/2/2014		Replacement of Riprap material will be further protect the stream bottom from erosion and restore the site to its previous condition.
1G	Segments 2-4	Obtain Regulatory approval of work plan				Regulatory approval shall include action levels for arsenic, excavation and removal of material, transportation of material, final deposition of removed material, and restoration of the drainage.
2D	Segment 1	Reseed impacted areas in - Segment 1	5/12/2014	6/2/2014		Revegetating immediately downstream of the desilting basins will minimize offsite migration of fines during a storm event.
3A	Segments 2-4	Remove sediments from - Segments 2-4	6/2/2014	8/4/2014		Removal of sediments found upstream of the desilting basins will minimize the loading and the maintenance of the basins.
3B	Segments 2-4	Reconstruct drainage channel - Segments 2-4	6/2/2014	8/4/2014		Regrading of the disturbed area will allow for natural water flow and will be done concurrent with removal.
3C	Segments 2-4	Reseed impacted areas in - Segments 2-4	11/3/2014	11/26/2014		Revegetation of the drainage found upstream of the desilting basins will minimize the loading and the maintenance of the basins.



General Notes

- SEGMENT 1
- SEGMENT 2
- SEGMENT 3
- SEGMENT 4
- HAUL ROUTE
- DISPOSAL LOCATION
- PROPERTY NOT OWNED BY KENNECOTT
- CLAY HOLLOW
- SILT FENCE
- EXISTING STATE PERMITTED DAMS
- WELLS
- CHARACTERIZATION SAMPLE

0 1,500

Feet

ANDERSON
ENGINEERING COMPANY, INC.
SALT LAKE CITY, UTAH

WEST JORDAN PROPERTY
SEDIMENT REMOVAL
WORK SEGMENTS AND
DISPOSAL LOCATION
SALT LAKE COUNTY, UTAH

DRAWN BY:	CN
ENGINEER:	KC
APPROVED:	BA

DATE:	10-APR-2014
SCALE:	1" = 1,500'

1

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Rio Tinto Barneys Canyon

**Clay Hollow Drainage Channel
Soil Characterization and Removal Work Plan**

April 2014

Contents

1.	Introduction	1-1
1.1	Previous Work	1-1
2.	Characterization Sampling Procedures	2-1
3.	Laboratory Analysis	3-1
4.	Quality Assurance/Quality Control Procedures and Data Quality Objectives	4-1
5.	Removal Action Work Plan	5-1
5.1	Preliminary Activities	5-1
5.2	Impacted Soil Removal	5-1
5.2.1	Engineering Controls	5-2
5.3	Sediment Basin Construction	5-5
5.4	Post-Removal Sampling	5-5
6.	Response Schedule	6-1
7.	Documentation and Reporting	7-1
8.	Health and Safety	8-1

Tables

Table 4-1	Data quality objectives for internal laboratory analyses at Kennecott Environmental (KEL) and American West Analytical Laboratories (AWAL).
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Figures

Figure 1-1	Location Map
Figure 1-2	Clay Hollow Retention Basins
Figure 1-3	Pre-Characterization XRF Screening Locations
Figure 1-4	Pre-Characterization XRF Arsenic Results
Figure 2-1	Sample Location Overview
Figure 2-2	Proposed Characterization Sampling Locations
Figure 2-3	Proposed Characterization Sampling Locations
Figure 2-4	Proposed Characterization Sampling Locations
Figure 2-5	Proposed Characterization Sampling Locations
Figure 5-1	Estimated Removal Area
Figure 5-2	Proposed Haul Route

Appendices

Appendix A	Laboratory Analysis
Appendix B	Site Specific Health and Safety Plan
Appendix C	Personnel and Work Zone Air Monitoring Plan

1. Introduction

The Barneys Canyon Gold mine (Barneys Canyon) is located on the eastern flank of the Oquirrh Mountains about 25 miles southeast of Salt Lake City, Utah, and about 4 miles north of the Rio Tinto Kennecott (Kennecott) Bingham Canyon open pit. Mining began at Barneys Canyon in 1989. Deeply weathered oxide ore from the open pits was crushed, agglomerated and stacked onto five lined cyanide heap leach pads. After 1994, un-oxidized sulfide-bearing ore was also milled and the gold-bearing pyrite was recovered in a flotation plant. The pyrite concentrate was sent to the Kennecott smelter for smelting and gold recovery, and the tailings were agglomerated with the oxide ore and sent to the heap leach pads. Mining at Barneys Canyon ended in 2001, while the leaching operation continued until 2007, and rinsing of the pads continued until 2013.

In preparation for closure, soil characterization around the leach pads is currently being conducted, and the closure plan is being finalized. During the preliminary characterization being performed with a hand held X-Ray Fluorescence (XRF) instrument, sediments containing elevated concentrations of arsenic was discovered in the Clay Hollow drainage, an ephemeral channel which is located along the northern edge of the leach pads (see Figure 1-1 and Figure 1-2). XRF screening continued along the channel to the east, where it was discovered that fine grained sediments containing elevated arsenic has migrated off-site onto West Jordan city open space property.

An XRF has been used to perform initial screening of the West Jordan subject property. The purpose of this work plan is to outline the strategy for characterization sampling and delineation of the impacted area. In addition, this document includes a general plan for the removal of impacted sediment.

Barneys Canyon will have a community engagement strategy to proactively communicate with adjacent landowners and community officials regarding the soil characterization and removal work. This strategy will be developed in coordination with State agencies and the city of West Jordan.

1.1 Previous Work

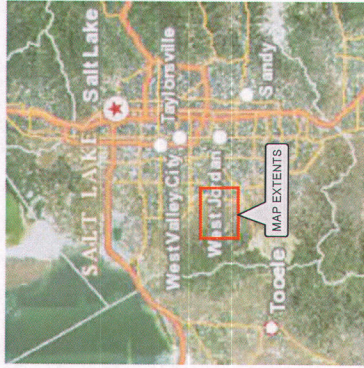
From March 26, 2014 through April 2, 2014 a hand held XRF was used as a screening tool to delineate the extent of sediment on the subject property containing elevated arsenic. Figure 1-3 shows the locations which were screened with the XRF. The locations are color-coded on the map to correspond with the action levels of 50 ppm arsenic or 500 ppm lead.

A single point grab sample (BCMRZ-001) was collected of the sediments within the channel at the western property boundary of the subject West Jordan parcel. The sample was analyzed by Kennecott Environmental Laboratory for total concentrations of the RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). The results of the analysis indicated an arsenic

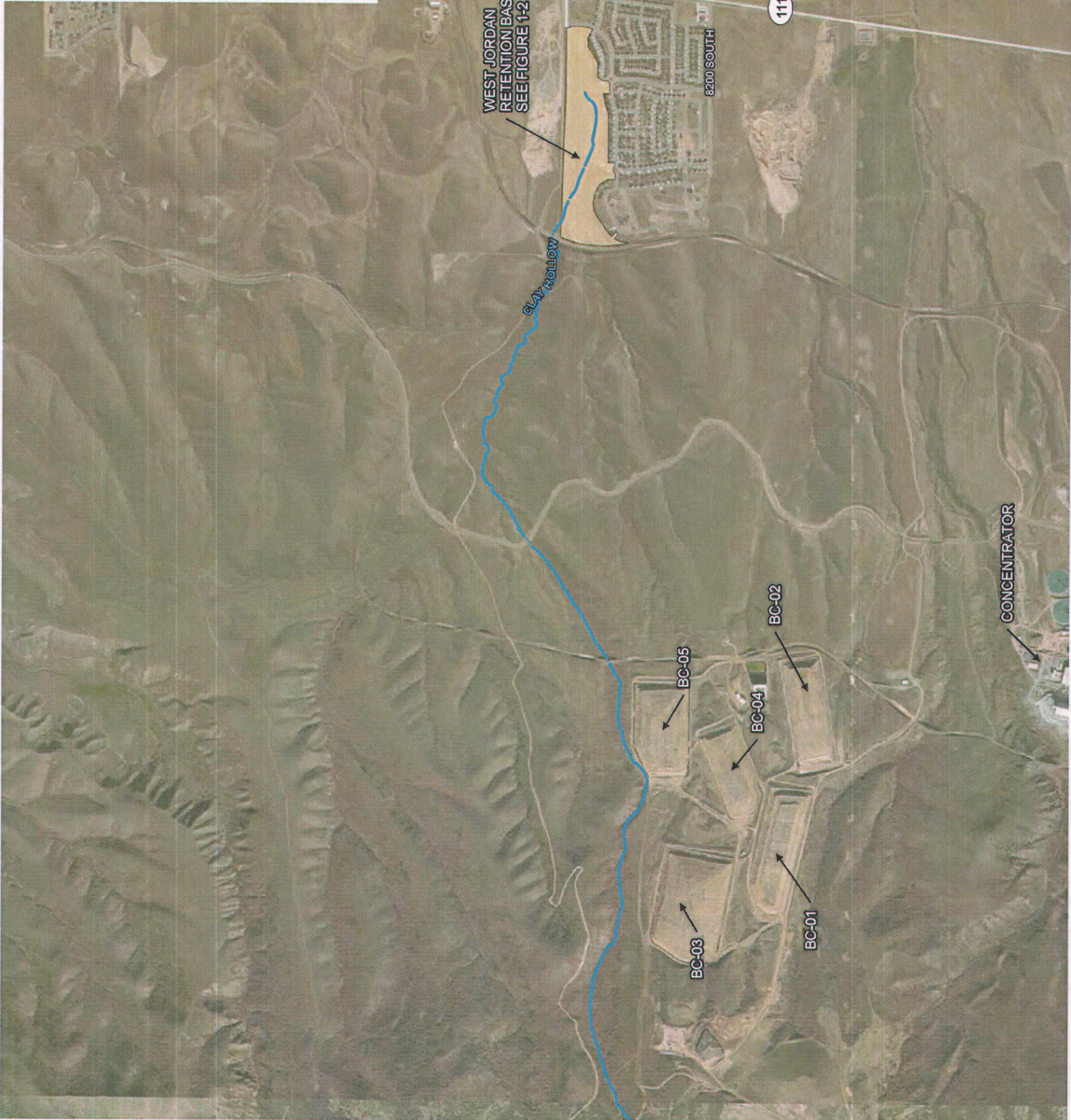
Rio Tinto Barneys Canyon

concentration of 5360 mg/kg, which was indicative of the XRF values encountered in the sediments. No other constituent had concentrations high enough to be of concern.

Figure 1-4 shows representative XRF arsenic values obtained on the West Jordan parcel, and includes the laboratory sample analyzed by KEL.



VICINITY MAP
(NOT TO SCALE)



- General Notes
- CLAY HOLLOW DRAINAGE CHANNEL
 - IMPACTED PARCEL OWNED BY CITY OF WEST JORDAN
 - HEAP LEACH PAD DESIGNATION

BC-05



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BARNEYS
CANYON



ANDERSON
ENGINEERING
SALT LAKE COUNTY, UTAH
JULY 1993 TO PRESENT

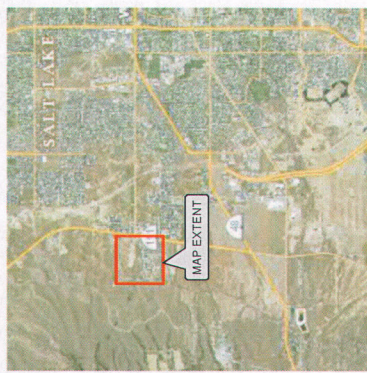
OVERVIEW
OF IMPACTED SECTION
OF CLAY HOLLOW

SALT LAKE COUNTY, UTAH

DRAWN BY:	SCA
ENGINEER:	NC
APPROVED:	BA

Project:	BCMR
Date:	02-APR-2014
Scale:	1" = 2,000'

1-1



General Notes

- PARCELS OWNED BY WEST JORDAN CITY
- PARCELS OWNED BY KENNECOTT
- CLAY HOLLOW DRAINAGE CHANNEL
- CULVERT
- RETENTION BASIN

0 125 250 500 Feet

N

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CANYON

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SALT LAKE CITY, UTAH
801.467.1000

WEST JORDAN
CLAY HOLLOW
RETENTION BASINS

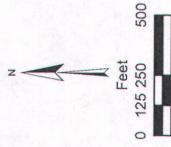
SALT LAKE COUNTY, UTAH

DRAWN BY:	CN
ENGINEER:	KC
APPROVED:	BA
DATE:	02-APR-2014
SCALE:	1" = 500'
SHEET:	1-2

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- General Notes
- XRF ARSENIC GREATER THAN 50 PPM
 - XRF ARSENIC LESS THAN 50 PPM
 - PARCELS OWNED BY WEST JORDAN CITY
 - PARCELS OWNED BY KENNECOTT
 - CLAY HOLLOW DRAINAGE CHANNEL



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CANYON



WEST JORDAN
CLAY HOLLOW
PRE-CHARACTERIZATION
XRF SCREENING LOCATIONS

SALT LAKE COUNTY, UTAH

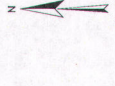
DRAWN BY: SCA
ENGINEER: KC
APPROVED: BA

1-3

DATE: 02-APR-2014
SCALE: 1" = 500'



- General Notes
- X ARSENIC GREATER THAN 50 PPM
 - X ARSENIC LESS THAN 50 PPM
 - LABORATORY ANALYZED SAMPLE WITH ARSENIC CONCENTRATION (mg/kg)
 - PARCELS OWNED BY WEST JORDAN CITY
 - PARCELS OWNED BY KENNECOTT
 - CLAY HOLLOW DRAINAGE CHANNEL



Feet
0 125 250 500

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CANYON



WEST JORDAN
CLAY HOLLOW
PRE-CHARACTERIZATION
ARSENIC RESULTS

SALT LAKE COUNTY, UTAH

DRAWN BY:	SCA
ENGINEER:	KC
APPROVED:	BA

Sheet	1-4
Date	02-APR-2014
Scale	1" = 500'

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2. Characterization Sampling Procedures

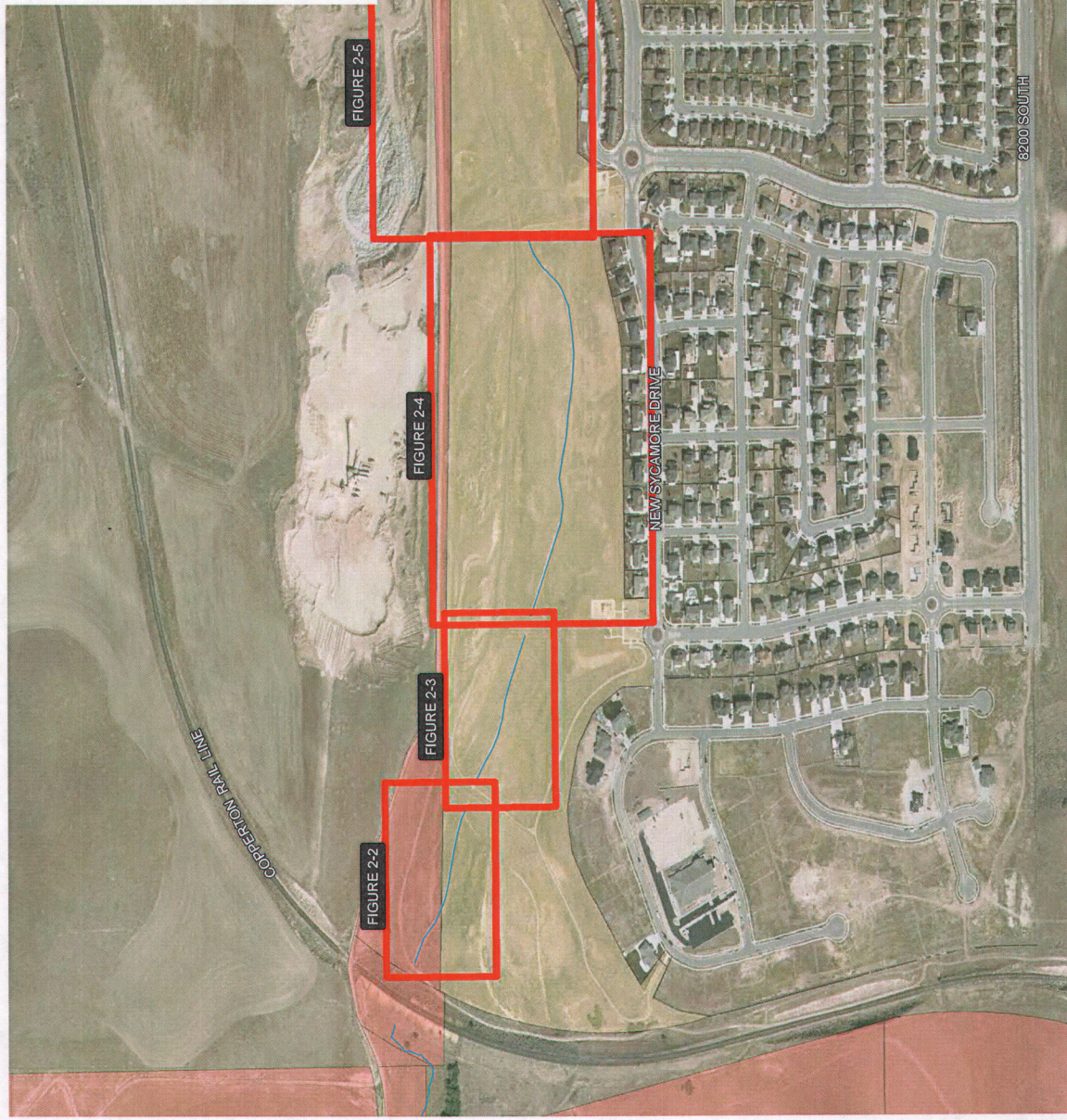
Based on the initial XRF screening, the elevated arsenic concentrations are found within the silty sediments which have migrated down the drainage channel and have settled out in low-lying areas. The material appears visually and texturally distinct from the underlying native soil. The contaminated sediments are generally tan colored silt whereas the underlying soil is a dark brown gravelly loam.

Sediment deposit thicknesses range from less than an inch to several inches, depending on the micro-surface topography of the native soil. The sediments are found generally within the rip rap lined channel constructed through the detention basins, although in locations where the channel empties into flat sedimentation areas, the elevated arsenic concentrations are found outside the channel alignment.

Sample locations have been chosen based on the initial XRF screening results and visual field observations of the sediment deposition areas. Each sample will be a linear or rectangular composite comprised of 4 to 5 evenly spaced aliquots. Figures 2-1 through 2-5 show the proposed composite sample locations. An XRF will be used during the characterization sampling to determine if there are other areas requiring sampling and to delineate areas with similar concentration ranges for compositing samples. The sample sites will be located in the field using a hand held Global Positioning System (GPS) unit capable of sub-meter accuracy.

Soil samples will be collected using hand tools such as spoons, trowels, or shovels. Sample depth will be dependent upon the thickness of the sediment at a particular sub-sample location, and will be determined using the hand tools specified above. In order to ensure that the concentration of the material is accurately represented, sediments and underlying soil will not be combined within the same sample. The XRF will be used to verify the thickness of sediment at each sampling location.

The sediment samples will be collected with clean disposable stainless steel spoons and placed in new plastic zip-seal bags for delivery to the analytical laboratory. Using disposable sampling equipment negates the need for decontamination.



General Notes

- PARCELS OWNED BY WEST JORDAN CITY
- PARCELS OWNED BY KENNECOTT
- CLAY HOLLOW DRAINAGE CHANNEL

0 125 250 500

Feet

N

RIO TINTO BARNEYS CANYON

ANDERSON
ENGINEERING COMPANY, INC.
SALT LAKE CITY, UTAH
SINCE 1975

WEST JORDAN CLAY HOLLOW SAMPLE LOCATIONS OVERVIEW

SALT LAKE COUNTY, UTAH

DESIGNED BY:	MBM
ENGINEER:	KC
APPROVED:	BA

2-1

DATE: 02-APR-2014

SCALE: 1" = 500'

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General Notes

- SUBSAMPLE LOCATION
- PARCELS OWNED BY WEST JORDAN CITY
- PARCELS OWNED BY KENNECOTT
- CLAY HOLLOW DRAINAGE CHANNEL



Feet
0 12.5 25 50

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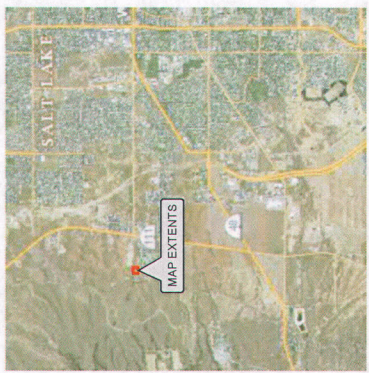
WEST JORDAN
CLAY HOLLOW
PROPOSED
CHARACTERIZATION
SAMPLING

SALT LAKE COUNTY, UTAH

DRAWN BY:	MBM
ENGINEER:	KC
APPROVED:	BA

DATE:	02-APR-2014
SCALE:	1" = 50'

2-2



General Notes

- SUBSAMPLE LOCATION
- CLAY HOLLOW DRAINAGE CHANNEL

0 12.5 25 50 Feet

N

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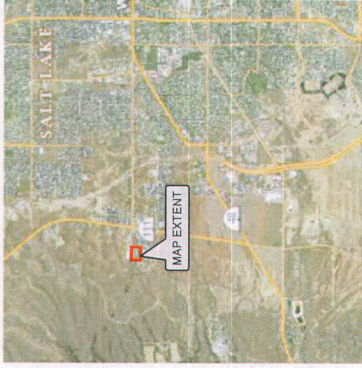
ANDERSON
ENGINEERING COMPANY, INC.
SALT LAKE CITY, UTAH 84119-2222
801.467.1222

WEST JORDAN
CLAY HOLLOW
PROPOSED
CHARACTERIZATION
SAMPLING
SALT LAKE COUNTY, UTAH

DRAWN BY:	MEB
ENGINEER:	AC
APPROVED:	BA

DATE:	02-APR-2014
SCALE:	1" = 50'
SHEET:	2-3

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General Notes

- SUBSAMPLE LOCATION
- CLAY HOLLOW DRAINAGE CHANNEL



Feet
0 25 50 100

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CANYON



WEST JORDAN
CLAY HOLLOW
PROPOSED
CHARACTERIZATION
SAMPLING

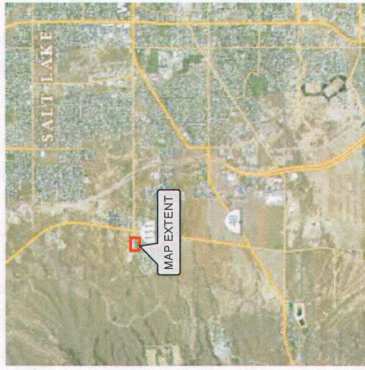
SALT LAKE COUNTY, UTAH

DRAWN BY: MBM
ENGINEER: KC
APPROVED: BA

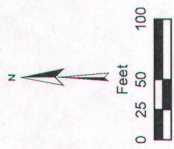
Project: ICMR
Date: 02-APR-2014
Scale: 1" = 100'

2-4

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- General Notes
- COMPOSITE SUBSAMPLE LOCATION
 - CLAY HOLLOW DRAINAGE CHANNEL



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WEST JORDAN
CLAY HOLLOW
PROPOSED
CHARACTERIZATION
SAMPLING
SALT LAKE COUNTY, UTAH

DRAWN BY:	MEB
ENGINEER:	KC
APPROVED:	BA
DATE:	02-APR-2014
SCALE:	1" = 100'

3. Laboratory Analysis

The pre-characterization screening indicated that the main contaminant of concern at the site is arsenic. As such, arsenic concentrations will drive the remediation effort. The action levels used for the removal work are established for lead (500 mg/kg) and arsenic (50 mg/kg).

Samples collected for characterization and post-removal verification will be delivered to Kennecott Environmental Laboratory (KEL) to be analyzed for total concentrations of arsenic and lead using EPA Methods SW 846, 3050B (sample preparation) and 6010C (analysis).

4. Quality Assurance/Quality Control Procedures and Data Quality Objectives

The purpose of data quality assessment is to assure that data generated under the QA/QC program is reconciled, accurate and consistent with program data quality objectives. The quality of the data will be assessed based on precision, accuracy and completeness.

Precision is the degree to which a measurement is reproducible and in part will be assessed by the comparison of split sample results. One out of fifteen of the samples analyzed at KEL will be split and the split samples will be analyzed at KEL and an outside laboratory for comparison. Prior to splitting, the samples will be prepared by drying and then crushing/grinding to the less than #35 sieve size. The prepared sample will be analyzed at KEL and the outside lab. Split sample results will be used to evaluate laboratory precision by calculating the Relative Percent Difference (RPD) of the splits. The RPD is defined as:

$$RPD\% = [(A1-A2)/((A1+A2)/2)] * 100$$

- A1 = Analytical result from laboratory #1
- A2 = Analytical result from laboratory #2

The data quality objective for the prepared split sample analyses will be an RPD of <35%.

The precision by which each lab performs a requested analysis will be assessed by their comparison of duplicate samples under their respective quality assurance project plans. As it pertains to KEL, precision will be evaluated by calculating the RPD of the original and lab duplicate samples. As it pertains to AWAL, precision will be evaluated by calculating the RPD of the matrix spike and matrix spike duplicate samples. Each lab's respective data quality objective for this precision analysis is provided in Table 4-1.

Percent accuracy is a determination of how close the measurement is to the true value and will be assessed via spike recovery in sample matrices, blanks and laboratory reference sample analyses. Percent accuracy will be assessed by the laboratory as part of their QA/QC procedures.

Completeness is a measure of the amount of valid data obtained, compared to the amount that was expected under normal conditions. Ninety (90%) percent completeness is the goal of this Sampling Plan.

Both the primary and secondary laboratories will comply with their Quality Assurance Project Plans. Laboratory Quality Assurance Reports (LQAR) will be reviewed to insure that the laboratory data quality objectives are met. LQAR will be included in the final report along with the laboratory analytical certificates. The data quality objectives for the KEL and AWAL internal lab analysis are listed in Table 4-1.

As it pertains to the use of the XRF to pre-screen soils during the characterization effort, a specific data quality objective is not necessary. Previous comparison of Kennecott's XRF analytical data with laboratory data has documented a good correlation. However this characterization effort will depend on laboratory analysis of collected soil samples.

Table: 4-1: Data quality objectives for internal laboratory analysis at Kennecott Environmental (KEL) and American West Analytical Laboratories (AWAL).								
Lab	Analytical Method	Original/ Duplicate (RPD%- Lab Precision)	Matrix Spike (% Recovery)	Matrix Spike Duplicate (% Recovery)	Matrix Spike/Matrix Duplicate (RPD%-Lab Precision)	Blank (% Recovery)	Spiked Blank (% Recovery)	Lab Control Sample (% Recovery)
KEL	3050B/6010C	+/- 20%	+/- 25%	NA	NA	<PQL	+/- 25%	+/- 20%
AWAL	3050B/6020A	NA	+/- 25%	+/- 25%	20%	<PQL	NA	+/- 15%

PQL: Practical Quantitation Limit

NA: Not analyzed

5. Removal Action Work Plan

In discussion with State agencies, an action level of 500 mg/kg lead and 50 mg/kg arsenic will be utilized at the site. This clean-up criteria is based on the unrestricted land use action levels established for mining related wastes at other Kennecott properties. If any additional action level is required the agencies will be consulted.

The following Remedial Action Plan has been prepared to address the removal of impacted soils from the subject property.

The following is a summary of the work plan tasks:

- Obtain site access agreements
- Provide sufficient notification to the public as required.
- Mobilization/Demobilization
- Conduct preliminary walkover of impacted area and complete XRF screening to determine concentrations of target metals in the stream bed and adjacent flood plain.
- Based on preliminary screening results, stake boundary of removal areas in the field using hand-held GPS instruments and complete an as-built survey of the anticipated removal area.
- Construct temporary fencing as-required.
- Excavate sediment control basin west of railroad.
- Remove contaminated sediments from affected areas using in-situ XRF screening to guide excavation activities and place sediments directly into haul trucks.
- Haul material to Barneys Canyon heap leach pad #3 or #5.
- Collect and analyze post-removal samples.
- Perform site restoration activities.

5.1 Preliminary Activities

West Jordan has provided access to Barneys Canyon to conduct characterization and a removal response as required. Prior to any excavation, a utility locating company will mark the locations of underground utilities.

Barneys Canyon will have a community engagement strategy to proactively communicate with adjacent landowners and community officials regarding the remedial action. This strategy will be developed in coordination with State agencies and the city of West Jordan.

5.2 Impacted Soil Removal

Impacted soil with levels exceeding the established action levels will be removed in the area generally shown in Figure 5-1. The area requiring remediation is assumed to be approximately 2500 feet long, 12 feet wide with varying depths. In general the impacted material is visually identifiable by its light tan, fine grain properties. Surface rock (channel rip rap), existing vegetation (predominately grasses) and all visually identifiable sediments will be excavated with an excavator or other appropriate equipment. Water will be used as required to minimize dust during excavation. Following the initial

material removal a hand-held XRF reading will be taken to verify that the impacted material has been removed.

Excavated soil will be directly loaded into haul trucks and hauled to Barneys Canyon heap leach pad #3 or #5. Haul roads will consist of private Kennecott and Barneys Canyon roads. Figure 5-2 displays the expected haul route to the Barneys Canyon heap leach pad area. Any spillage of impacted soil during the loading process will be pulled back into the excavation using the excavator and removed during subsequent truck loads. Loose impacted soil will be removed from the exterior surfaces of the trucks as necessary prior to exiting the site, in order to avoid any spillage on the haul roads.

As appropriate, the following guidelines and controls will be implemented during the removal work:

Optimizing and Minimizing Impact of Sediment Removal Work

- It is the goal of the project to minimize disturbance while removing sediment
- It is also understood that all removed sediment will be hauled off site
- Best Management Practices for optimal erosion and sediment control and for checking that all equipment is clean and in good working order will be followed

Equipment Criteria

- All equipment used for the project will be checked daily with a pre-shift inspection
- All hoses, hydraulic cylinders, transmission, coolant reservoirs and any oil reservoirs will be inspected for leaks
- Any equipment found to contain any leaks will not be allowed for use with the project until it is properly repaired
- Any leak observed during the course of work would also be removed until leak is repaired
- Right-sized and specified equipment will be used for sediment removal

Work Practices Along and Within the Channel

- Deposited sediment targeted for removal is yellow brown silt and clay sized material
- The removal will be guided by XRF screening and visual observation
- Post-removal sampling will occur with hand tools
- Avoid bank disturbance when possible to minimize any soil slough off from entering the drainages
- When accessing the drainage, it will be entered at right angles to minimize disturbance of the banks if safe and at all possible
- Minimize the disturbance of clean soil and vegetation along the drainage.
- If the sediment to be removed is interspersed within the vegetation, some damage, however, will occur during sediment removal

5.2.1 Engineering Controls

Engineering controls, such as water application before and during excavation and loading will ensure that both occupational and airborne emissions from the work zones are below the accepted levels for total suspended particulate including arsenic and lead. All trucks will be tarped. Air monitoring in accordance with the Air Monitoring Plan will be conducted during work activities. See Appendix C.

Silt fences will be installed below from the work area to prevent sediment from migrating down gradient within the Clay Hollow drainage channel.



- General Notes
- ESTIMATED AREA REQUIRING REMOVAL
 - PLANNED SETTLING POND LOCATION
 - PARCELS OWNED BY WEST JORDAN CITY
 - PARCELS OWNED BY KENNECOTT
 - CLAY HOLLOW DRAINAGE CHANNEL



RIO TINTO
BARNEYS
CANYON



WEST JORDAN
CLAY HOLLOW
ESTIMATED REMOVAL
AREA

SALT LAKE COUNTY, UTAH

DRAWN BY:	MBM
ENGINEER:	KC
APPROVED:	BA

DATE:	02-APR-2014
SCALE:	1" = 500'

5-1

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General Notes

HAUL ROUTE

HEAP LEACH PAD
BC-05
NUMBER

N

Feet

0 400 800 1,600

RIO TINTO
BARNEYS
CANYON



ANDERSON
ENGINEERING
INC.

WEST JORDAN
CLAY HOLLOW
REPOSITORY HAUL
ROUTE

SALT LAKE COUNTY, UTAH

DRAWN BY: MBM

ENGINEER: KC

APPROVED: DA

DATE: 15-APR-2014

SCALE: 1" = 1,000'

5-2

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5.3 Sediment Basin Construction

Prior to the excavation of the streambed down gradient, Barneys Canyon will install a sediment basin at the west entrance of the culvert that runs below the Copperton railroad grade. A sediment basin will be constructed by first removing impacted sediments and hauling material to the Barneys Canyon heap leach pads as described previously. After the initial sediment removal the basin will be excavated to allow for future settling of storm water flows that may occur before the up gradient channel is cleared of arsenic impacted sediments.

5.4 Post-Removal Sampling

Within the areas requiring sediment removal, post-removal samples will be collected from the excavated surface. Composite samples will be collected at the same sub-sample locations as the characterization samples falling within the removal boundaries. Samples will be collected using new disposable stainless steel spoons and placed in new plastic zip-seal bags.

6. Response Schedule

Barneys Canyon, immediately upon gaining knowledge of the mining related impacts in the Clay Hollow drainage took action to prevent visitors from exposure to the material. Actions have included placing fence along the edges of the channel, notification of agencies and surrounding residents and patrolling the area to keep visitors to the property from contacting material. Barneys Canyon will continue to mitigate potential exposure by minimizing dust until excavation begins and during removal activities. It is anticipated that construction will begin within two weeks of approval to proceed from the agencies.

7. Documentation and Reporting

Sampling procedures and field observations during the characterization and removal work will be documented on field log sheets. Sample locations will be photographed and surveyed using a hand held Global Positioning System unit capable of sub-meter accuracy. Sample information sheets, field log sheets and photos will be compiled as part of the project report.

Chain of custody will be maintained for all samples and recorded on chain of custody forms. A report documenting the characterization and removal activities will be submitted to the appropriate agencies after all analytical data has been received.

8. Health and Safety

Soil characterization and removal activities will adhere to specific project health and safety requirements, which include the attached Site Specific Health and Safety Plan (Appendix B) and the Personnel and Work Zone Air Monitoring Plan (Appendix C). Personnel training requirements will include:

- Barneys Canyon contractor training via Kennecott annual contractor orientation training.
- 40 hours of initial health and safety training for Hazardous Waste Site Operations (HAZWOPER under 29 CFR 1910.120) and subsequent annual 8 hour refresher.

Clay Hollow Drainage Channel
Soil Characterization and Removal Work Plan

Appendix A

Laboratory Analytical Data



Rio Tinto Kennecott
Environmental Laboratory
CERTIFICATE OF ANALYSIS
Sample Type: EPA Method 3050 B TOTAL METALS
Date: 03-Apr-14

2500 S 9180 W
Magna, UT 84044-6001
Phone (801) 569-7952

To: LARRY ELKIN

Sample Preparation: SWA 846 Method 3050 B
Metals Analysis: SWA846 Methods 6010C and 7471

Submission Date: 03/28/2014

QC Reference Sample: **AW04240**

Lab No.	Sample Description	Collection Date	Analysis Date	Analyte	Result	Reporting Limits	Units
AW04209	BCMRZ-001	03/28/2014	04/01/2014	Silver	Below PQL	5	mg/kg
			04/01/2014	Arsenic	5360	4	mg/kg
			04/01/2014	Barium	2300	2	mg/kg
			04/01/2014	Cadmium	4	1	mg/kg
			04/01/2014	Chromium	27	2	mg/kg
			04/01/2014	Mercury	2.9	0.10	mg/kg
			03/31/2014	Moisture %H2O	29		%
			04/01/2014	Lead	25	3	mg/kg
			04/01/2014	Selenium	32	5	mg/kg

Approved
By:

Approved by: Melissa R. Olsen
KEL Laboratory Director

Clay Hollow Drainage Channel
Soil Characterization and Removal Work Plan

Appendix B

Site Specific Health and Safety Plan

Rio Tinto Barneys Canyon

Site Specific Health and Safety Plan

Clay Hollow Drainage Channel Soil Characterization and Removal

April, 2014

Contents

1.0	INTRODUCTION	1
2.0	COMPREHENSIVE WORK PLAN	1
3.0	SAFETY AND HEALTH HAZARD ANALYSIS	1
3.1	Physical Hazards	1
3.1.1	Heat Exhaustion	1
3.1.2	Cold Exposure	2
3.1.3	Inclement Weather	2
3.1.4	Utility Lines	2
3.1.5	Noise	2
3.1.6	Heavy Equipment	2
3.1.7	Dust Suppression	2
3.1.8	Other Physical Hazards	3
3.2	Chemical Hazards	3
3.2.1	Arsenic	3
3.2.2	Lead	3
3.2.3	Cadmium	3
3.2.4	Selenium	4
3.3	Hazard Mitigation	4
4.0	PERSONAL PROTECTIVE EQUIPMENT	4
5.0	TRAINING REQUIREMENTS	4
6.0	DECONTAMINATION PROCEDURES	5
7.0	SITE CONTROL	5
8.0	AIR MONITORING	5
9.0	MEDICAL SURVEILLANCE PROGRAM	6
10.0	STANDARD OPERATING PROCEDURES/SAFE WORK PRACTICES	6
11.0	EMERGENCY COMMUNICATION PROCEDURE	7
12.0	NAMES AND NUMBERS OF KEY PERSONNEL	7
	Signature Form	8

APPENDIX B

SITE SPECIFIC HEALTH AND SAFETY PLAN

1.0 INTRODUCTION

This Health and Safety Plan (HASP) applies to activities related to the response action for sediments in the Clay Hollow drainage channel. Project activities will include site characterization, removal and disposal of contaminated soils, and removal and disposal of sludge. The work will be conducted by employees, contractors, and subcontractors of Barneys Canyon. This HASP will be available at all times for review by employees, contractors, subcontractors, regulatory agencies, or representatives thereof. All visitors are expected to be familiar with and comply with all aspects of this HASP.

This HASP is designed to identify, evaluate, and control health and safety hazards associated with this response. This HASP is based on existing information regarding the entire site and similar work conducted to date on Barneys Canyon property. Addressed are specific safety and health hazards and procedures necessary to protect the employees conducting the various projects from these hazards. If additional site-specific health and safety issues arise that are not addressed in this HASP, an addendum will be included prior to the start of work activities. Each contractor will also provide a Safety, Health, and Environmental Action Plan (SHEAP) before their particular projects begin.

It is anticipated that field conditions will vary during specific projects. As actual site conditions change, sections of the HASP may change and will be subject to approval by the Health and Safety Officer (HSO). Such changes will be communicated to all employees.

2.0 COMPREHENSIVE WORK PLAN

A comprehensive Work Plan for the operations to be conducted precedes this HASP. The Work Plan describes work tasks, objectives, and personnel requirements. The excavation, haulage, and placement of materials in the designated repository is outlined in the Work Plan.

3.0 SAFETY AND HEALTH HAZARD ANALYSIS

The potential hazards associated with site activities include both chemical and physical hazards. Equipment operators and laborers directly involved in day-to-day project activities have the greatest potential for exposure to these hazards. Haulage truck operators and site supervisors generally have a lower potential of exposure to these hazards. The levels of exposure will be addressed appropriately.

3.1 Physical Hazards

This section describes normal physical construction and demolition site hazards.

3.1.1 Heat Exhaustion

Heat exhaustion occurs when the body loses so much water and electrolytes through heavy sweating that fluid depletion (hypovolemia) occurs. For sweating to be an effective cooling mechanism, the sweat must be able to evaporate from the body surface. If evaporation does not take place, cooling will not occur. Heat exhaustion is a potential hazard associated with elevated body temperatures caused by high ambient air temperatures and high humidity, heavy physical labor, wearing personal protective equipment, and/or any combination thereof. This hazard will be evaluated on a day-to-day basis by the Barneys Canyon Project Coordinator and HSO.

3.1.2 Cold Exposure

Cold injury (frostbite and hypothermia) and impaired work ability are potential hazards at low ambient air temperatures and/or when the wind chill factor is low. The symptoms associated with cold exposure are excessive shivering, loss of control of muscle activity, becoming lethargic and losing interest in combating cold, and finally decreased vital signs. This hazard will be evaluated on a day-to-day basis by the Barneys Canyon Project Coordinator and HSO.

3.1.3 Inclement Weather

Rain, snow, extreme low or high temperatures, or high winds may occur during scheduled work activities. All employees will be trained in the hazards of exposure to cold and/or wet conditions. Protective clothing for cold and/or wet, slippery conditions will be used when needed. Severe weather conditions may result in cessation of work activities at the discretion of the Project Manager, Barneys Canyon Project Coordinator or HSO.

3.1.4 Utility Lines

Overhead and buried utility lines may be present near work areas. All operators and ground personnel should always be aware of all overhead hazards and warn each other of potential danger. All underground utilities will be located and clearly marked prior to demolition or excavation. Any valve or electrical switch going into an area under demolition must be locked and tagged or physically disconnected. Metering electrical lines and opening valves on utility lines will be performed to verify each service has been disconnected prior to demolition. Appropriate precautions will be taken when working around overhead and underground utilities.

3.1.5 Noise

Exposure to elevated noise is expected for heavy equipment operators and potentially to ground personnel. Engineering controls will be used to manage this hazard and supplemented by wearing the appropriate level of hearing protection when necessary. Either ear plugs or muffs will be encouraged for heavy equipment operators, laborers, and any other personnel working near the equipment. The HSO will assist in determining the engineering controls and proper level of hearing protection to be worn by site personnel.

3.1.6 Heavy Equipment

As on all construction sites, there is potential for personal injury. American National Standards Institute (ANSI) approved safety equipment will be required at all times. Hard hats, steel-toed boots, long-sleeve shirt and safety glasses will be required to guard against head, foot, and eye injuries. All required construction equipment will have appropriate audible or visual warning alarms. Applicable Mine Safety and Health Administration (MSHA) and Occupational Safety and Health Administration (OSHA) regulations will be followed and enforced.

The excavation standard outlined in 29 Code of Federal Regulations (CFR) 1926.650 will be adhered to at all times. An excavation permit will be issued by the HSO before excavating begins. Upon completion of the excavation, a competent person will inspect excavations that personnel must enter to ensure proper sloping or shoring has been achieved. This inspection must take place before any person enters the excavation.

3.1.7 Dust Suppression

Dust may be generated during excavation, transportation, and placement of material. Water spray and tarping of transport vehicles, or other controls will be used as necessary to control dust levels. Air monitoring will be conducted to ensure occupational exposures to emissions from work areas are below accepted safe levels. (Refer to the Personnel and Work Zone General Air Monitoring Plan for Clay Hollow drainage channel soil characterization and removal work plan).

The OSHA Action Level (AL) for Total Suspended Particulates (TSP) based on an 8-hour time-weighted average is 7500 micrograms per cubic meter. The OSHA Permissible Exposure Limit (PEL) for TSP based on an 8-hour time-weighted average is 15 milligrams per cubic meter.

3.1.8 Other Physical Hazards

Other physical hazards such as insect bites, bee stings, etc., may occur during construction/demolition, and placement operations. The hazard will be evaluated on a case-by-case basis.

3.2 Chemical Hazards

Based on available information regarding the sites, metals of concern identified in the soils are arsenic, cadmium, lead, and selenium. If these and/or other chemical hazards become evident, engineering controls and appropriate levels of personnel protective equipment (PPE) will be used to protect the health and safety of personnel on the site and prevent off-site migration. All employees will be notified of any new hazards as they become known.

3.2.1 Arsenic

Arsenic is a solid material with no odor. Potential exposure routes are through inhalation or ingestion. Skin contact can also result in adverse effects. Some arsenic compounds may cause irritation of the eyes, mucous membranes, respiratory system, and skin. Dermatitis can also result from poor personal hygiene when working around these materials. Excessive inhalation of arsenic may result in respiratory problems such as coughing and chest pain. Other symptoms include giddiness, headache, and extreme weakness preceding gastrointestinal irregularities. Prolonged exposure can result in weight loss, nausea, diarrhea, pigmentation of skin, and loss of hair. Arsenic is considered a carcinogen; a cancer-causing substance. Arsenic may be present in soils, demolition and flue dust.

The OSHA AL for arsenic is 5.0 micrograms per cubic meter based on an 8-hour time-weighted average. The OSHA PEL based on an 8-hour time-weighted average is 10 micrograms per cubic meter.

3.2.2 Lead

Lead is a solid material with no odor. Potential exposure routes are through inhalation or ingestion. The early effects of overexposure to lead are nonspecific and are difficult to distinguish from the symptoms of minor seasonal illnesses, except by laboratory testing. The symptoms are decreased physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles, abdominal pains, and decreased appetite. More advanced effects include anemia, pallor, a "lead line" on the gums, and decreased hand grip strength. Lead is not considered a carcinogen but it is classified as a reproductive toxin and a teratogen (causes fetal malformation). Lead present in the tailings is bound in a mineral matrix and is not present as a pure substance. Therefore, the possibility of acute exposure to lead is unlikely. Lead may be present in paints, soils, demolition and flue dust. In the event that cutting on lead based paint becomes a necessity, abatement of the lead will be performed when feasible. Personal protective equipment will be used when appropriate.

The OSHA AL for lead is 30 micrograms per cubic meter. The OSHA PEL for lead is 50 micrograms per cubic meter.

3.2.3 Cadmium

Cadmium is a blue-white, malleable, lustrous metal or a grayish-white powder. Some cadmium compounds may also appear as a brown, yellow, or red powdery substance. Potential exposure routes for cadmium are through ingestion or inhalation. The main adverse health effects associated with cadmium are lung cancer and kidney dysfunction. Early symptoms may include mild irritation of the upper respiratory tract, a sensation of constriction of the throat, a metallic taste and/or a cough. Indications of prolonged exposure to cadmium would include shortness of breath, chest pain, and flu-like symptoms. Cadmium is a naturally-occurring environmental contaminant to which humans are continually exposed to in food, water, and air. A non-occupational source of cadmium is smoking tobacco. Cadmium may be present in soils, demolition and flue dust.

The OSHA AL for cadmium is 2.5 micrograms per cubic meter. The OSHA PEL for cadmium is 5 micrograms per cubic meter.

3.2.4 Selenium

Selenium is a red to gray solid. Selenium may enter the body by inhalation, absorption, or ingestion. Some of the symptoms of exposure to selenium are irritated eyes, nose, and throat, visual disturbance, dermatitis, gastrointestinal disturbance, headaches, chills, and fever. Other symptoms of exposure are garlic breath and a metallic taste in the mouth. Selenium may be present in soils, demolition and flue dust.

The OSHA AL for selenium is 100 micrograms per cubic meter. The OSHA PEL for selenium is 200 micrograms per cubic meter.

3.3 Hazard Mitigation

The hazards identified in the above sections, and any additional hazards which arise or are identified during work activities will be mitigated by engineering controls, PPE and other safety procedures. Physical hazards will be mitigated by the implementation and enforcement of standard operating procedures described in Section 10.0. Chemical hazards will be identified through site characterization, soil sampling and the air monitoring program described in Section 8.0 and mitigated by the use of PPE, engineering and site controls.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Occupational exposures to arsenic, lead, cadmium, selenium, and TSP are expected to be below action levels specified in the CFR 1910.1000. Therefore, the level of personal protection to be utilized for all initial site activities is modified Level D which includes use of a respirator when necessary as determined by the Barneys Canyon Project Coordinator or the HSO. Level D PPE shall consist of a hard hat (ANSI Z89), safety glasses (ANSI Z87), steel-toed boots (ANSI Z41 with substantial leather 6 inch uppers and cut heels), and long-sleeve shirt. Gloves and hearing protection may be required for task specific work. Work zone visitors will be required to wear applicable safety equipment depending on site specific conditions. The level of protection will be adjusted according to results of employee exposure monitoring, specific job functions, or as site conditions change.

5.0 TRAINING REQUIREMENTS

Project employees will receive a minimum of 40 hours of initial health and safety training for Hazardous Waste Operations and Emergency Response (HAZWOPER), with applicable 8 hour annual refreshers. Copies of training certificates and other training documentation will be kept on file near the job site by the individual contractors.

Employees will be trained to a level required by their job function and responsibility before being permitted to engage in field activities. Pre-project safety information will include:

- Names of personnel and alternates responsible for site safety and health;
- Chemical and physical hazards present on the site;
- Work practices by which risks from hazards can be minimized;
- Detailed review of this HASP and Barneys Canyon Emergency Protocols;
- Safe use of engineering controls and equipment on the site;
- Use of personal protective equipment; and
- Medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards.

Site safety meetings (tailgate meetings) will be held at least weekly to notify personnel of specific hazards, air monitoring results, changes in the HASP, or other topics determined by the HSO and Construction Superintendent. Specific meetings will be held at the initiation of new or different field activities and at the time of any crew changes. Barneys Canyon will conduct weekly supervisor planning/safety meetings.

6.0 DECONTAMINATION PROCEDURES

Equipment decontamination will be conducted on-site as appropriate. Equipment decontamination will consist of physically removing visible contamination from contact points of the equipment at completion of work tasks and before leaving the work area. The removed material will be transported to the designated repository.

Personal decontamination, where required, will consist of removing and leaving outer PPE at the temporary staging area and good personal hygiene. The staging area will have facilities for washing exposed skin. Employees will be required to wash with soap and water at each break, lunch period and at the end of the work shift. Workers and visitors will be required to pass through and use the staging area when exiting the work zone.

Decontamination procedures will be monitored by the HSO to determine their effectiveness. If such procedures are found to be ineffective, they will be altered to correct any deficiencies.

7.0 SITE CONTROL

Work areas, as necessary, will have perimeter fencing or be otherwise barricaded as the situation requires. "Authorized Personnel Only" signs will be posted at regular intervals around the perimeter and at each entrance to a site. Plant Managers will be notified of each project and a Safety Bulletin will be disseminated to the respective plant personnel.

8.0 AIR MONITORING

Air monitoring will be conducted by Barneys Canyon to evaluate the potential for employee exposure to airborne contaminants and to determine the overall contribution of work activities to ambient air quality. Prior to any activities on site, background air samples will be collected to establish a datum for site activities. During excavation and placement activities, quantitative air sampling will be conducted to determine potential employee exposure.

All air samples will be collected and analyzed according to the appropriate National Institute of Occupational Safety and Health (NIOSH) or Occupational Safety and Health Administration (OSHA) methods (see Appendix C to the Work Plan).

Quantitative personal samples will be collected using constant-flow pumps that draw air through filter media. The samples will be handled under chain-of-custody procedures and delivered to a qualified laboratory for analysis.

Employees out of each job classification, for each shift, and in each work area will be selected for personal monitoring. At the start of field activities and periodically thereafter, occupational air samples will be collected and analyzed for arsenic, lead, cadmium, selenium, and TSP. Additional air monitoring will be conducted whenever there is a change in work conditions which can be expected to result in new or additional exposure levels or whenever an employee complains of symptoms which may be attributable to exposure from contaminants in his/her work area.

Qualitative work zone air monitoring will be conducted as needed using real-time instruments.

9.0 MEDICAL SURVEILLANCE PROGRAM

A medical surveillance program provides a means of selection of employees who are physically able to safely perform the work assigned and monitor their health on a regular basis. The medical surveillance program to be implemented for this project will comply with 29 CFR 1910.120(f).

The program consists of a pre-employment medical evaluation to determine fitness for the job assignment, an annual evaluation based on length of assignment or attending physicians opinion (no greater than biennially), and an end-of-employment evaluation. In addition, a special evaluation is warranted when an employee indicates that they may have developed symptoms resulting from a possible exposure to hazardous substances.

Medical surveillance will be conducted for all site personnel who may be exposed to arsenic, lead, cadmium, or selenium in excess of ALs, without regard to the use of respirators, for 30 days or more per year. All personnel participating in the medical surveillance program will have an examination which equals or exceeds the following:

- Medical and Occupational History;
- Physical Examination;
- Pulmonary Function Test;
- Six Frequency Audiogram;
- Urinalysis, with microscopic morphology and dipstick;
- Complete Blood Count;
- CHEM 20 Chemistry Screen;
- SAM 9a Drug Screen;
- Chest X-Ray (scanned by a "B" reader); and
- Blood lead and urine arsenic, cadmium, chromium, and selenium levels. (Urine arsenic samples will be speciated if levels are higher than 45ug/gm of creatinine)

Exit medicals will consist of the following:

- Blood lead levels; and
- Urine arsenic, cadmium, and selenium levels.
(Urine arsenic will be speciated if levels are higher than 45ug/gm of creatinine)

All contractor personnel with the potential for chemical exposure are required to have medical monitoring which equals or exceeds this program. Visitors who will enter the work area may be required to demonstrate participation in a medical program which is equivalent to or exceeds this program. The HSO will determine which personnel must meet training and medical monitoring requirements.

Prior to the start of project activities, all employees with potential for airborne contaminant exposure will have a baseline evaluation conducted for lead levels in blood and urine arsenic, cadmium, and selenium levels. These evaluations are to be repeated at the completion of work activities or at the end of employment.

Copies of the physician's written opinion for the capability of the individual to work in areas with a potential for arsenic, lead, cadmium, and selenium exposure and the ability to wear a respirator will be maintained by the HSO for all workers on-site. The completed and signed respirator fit test form will be kept in the same file.

10.0 STANDARD OPERATING PROCEDURES/SAFE WORK PRACTICES

Standard operating procedures and safe work practices for this project consist of Barneys Canyon General Safety for Contractors, Barneys Canyon Emergency Protocols, and the following:

- No alcohol, firearms, or illegal drugs will be allowed on-site.
- Any employee under a physician's care and/or taking prescribed medication must notify the Site Health and Safety Officer.
- Eating, drinking, smoking and chewing tobacco or gum are allowed only in designated areas and never in the removal work zone or at the disposal site.

- All personnel shall listen for warning signals on construction equipment and shall yield to equipment.
- All equipment operators shall pay careful attention to workers on the ground who may be in their path and provide warning to these people before moving. All employees working regularly on the ground near heavy equipment will wear orange vests with reflective tape. Operators shall also pay deliberate attention to all types of utility lines and sources.
- All personnel are required to be familiar with and abide by the security rules, and emergency procedures.
- All personnel must immediately report any injuries, vehicle accidents, and/or illnesses to their supervisor. This includes minor or slight injuries.
- All newly hired employees must pass a pre-work assignment physical, drug test and subsequent exams as required by this HASP.
- All personnel must participate in the air-quality exposure monitoring program by wearing personal monitors or sampling devices designated by the Site Health and Safety Officer.
- All personnel must abide by all safety rules and procedures as described in the work rules and/or throughout the project.
- Remember, safety starts with you.

11.0 EMERGENCY COMMUNICATION PROCEDURE

In the event of a medical, fire, or any other type of emergency, Kennecott Emergency Response Team will help on behalf of Barneys Canyon. Workers shall follow the Kennecott Emergency Response Team Zones map in the Project Book. For offsite work the notification for emergencies will be 911. For emergencies within the Barneys Canyon property boundary, the emergency number is 801-569-6911 (Copperton)

An emergency may also be communicated by transmitting on Radio Channel 1. The Emergency Medical Technician (EMT) at the respective guard shack will obtain the necessary information and notify the proper authorities. The EMT will respond to the scene and assess the situation.

12.0 NAMES AND NUMBERS OF KEY PERSONNEL

The following persons have been identified to oversee the safety and health of employees involved with Barneys Canyon work activities:

Name	Phone

Signature Form

By signing below, I have read and understand the Health and Safety Plan above and I will abide by all safety guidelines established herein at all times.

[illegible]

General Notes

HOSPITAL ROUTE

0 800 1600 3200

Feet

N

RIO TINTO BARNEYS CANYON

ANDERSON

ENGINEERING & SURVEYING, INC.

1000 WEST 2100 SOUTH, SUITE 100

SALT LAKE CITY, UT 84119

WEST JORDAN CLAY HOLLOW HOSPITAL ROUTE MAP

SALT LAKE COUNTY, UTAH

DESIGNED BY:	MBM
ENGINEER:	KC
APPROVED:	BA

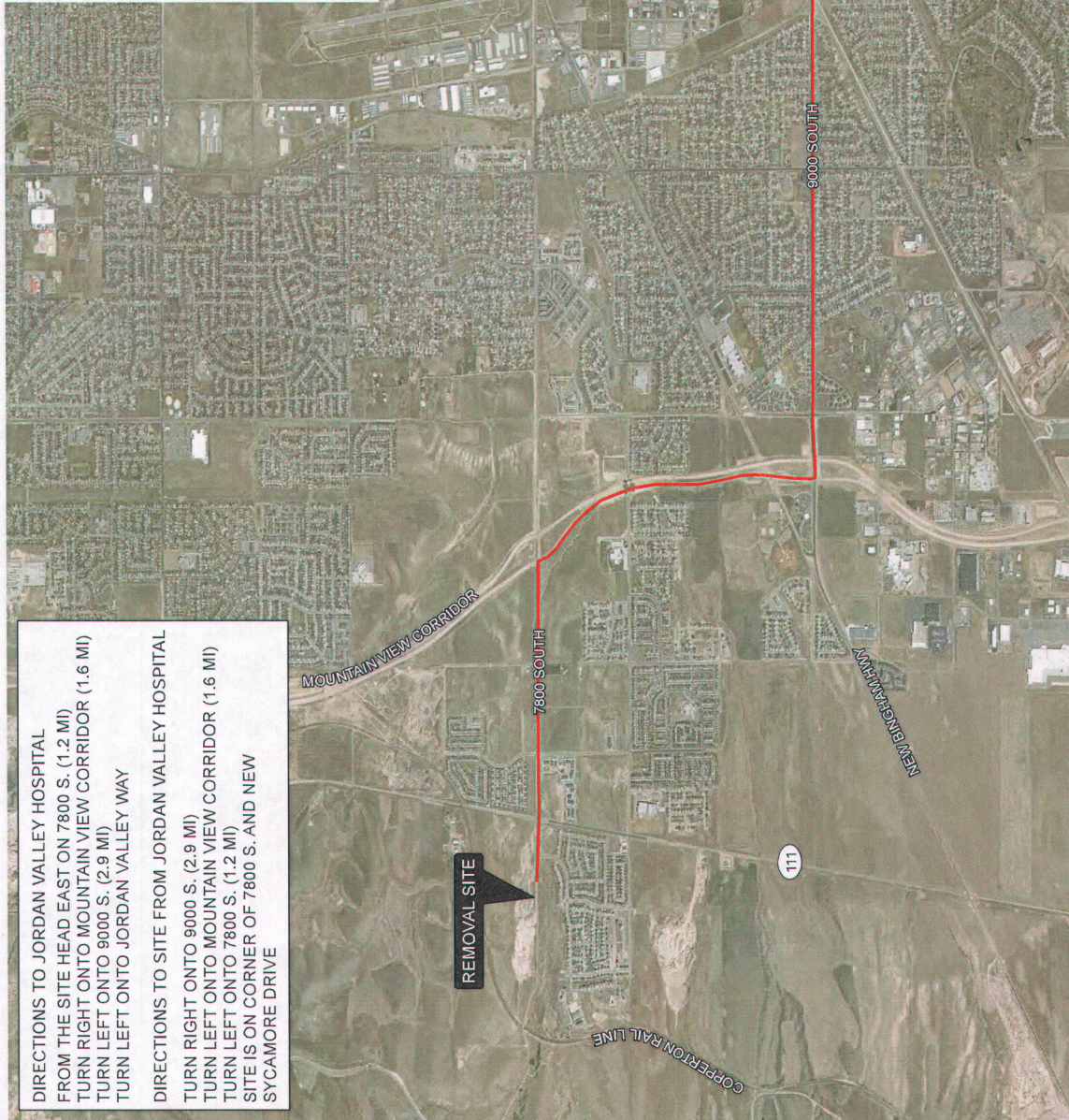
B-1

DATE: 03-APR-2014

SCALE: 1" = 3,200'



VICINITY MAP
(NOT TO SCALE)



DIRECTIONS TO JORDAN VALLEY HOSPITAL
FROM THE SITE HEAD EAST ON 7800 S. (1.2 MI)
TURN RIGHT ONTO MOUNTAIN VIEW CORRIDOR (1.6 MI)
TURN LEFT ONTO 9000 S. (2.9 MI)
TURN LEFT ONTO JORDAN VALLEY WAY

DIRECTIONS TO SITE FROM JORDAN VALLEY HOSPITAL
TURN RIGHT ONTO 9000 S. (2.9 MI)
TURN LEFT ONTO MOUNTAIN VIEW CORRIDOR (1.6 MI)
TURN LEFT ONTO 7800 S. (1.2 MI)
SITE IS ON CORNER OF 7800 S. AND NEW SYCAMORE DRIVE

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Clay Hollow Drainage Channel
Soil Characterization and Removal Work Plan

Appendix C

Personnel and Work Zone Air Monitoring Plan



Rio Tinto Barneys Canyon

Personnel and Work Zone General Air Monitoring Plan

Clay Hollow Drainage Channel Soil Characterization and Removal

April, 2014

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Purpose	1
1.2	Objectives.....	1
2.0	AIR SAMPLING	1
2.1	Standard Operating Procedures.....	2
2.2	Background Air Sampling	2
2.3	Quantitative Air Sampling.....	3
2.4	Qualitative Air Sampling	3
3.0	QUALITY ASSURANCE AND QUALITY CONTROL	3
3.1	Instrument Calibration.....	3
3.2	Air Sampling Documentation.....	4
3.3	Chain-of-Custody.....	4
3.4	Quality Control Blanks	5
3.5	Quality Control Audits.....	5
3.6	Quality Assurance Reports to Management	5
4.0	ANALYTICAL METHODS	6
5.0	SAMPLING PLAN	6
6.0	ENGINEERING CONTROLS AND WORK PRACTICES	6

LIST OF TABLES

Table 1 Limits for Air Contaminants

Table 2 Required Pumped Air Sample Volumes In Relation to Action Levels

PERSONNEL AND WORK ZONE GENERAL AIR MONITORING PLAN

1.0 INTRODUCTION

Rio Tinto Barneys Canyon will be conducting soil removal along the Clay Hollow drainage channel in West Jordan, Utah. This Air Monitoring Plan will be part of the project plan and presents the methodology to be used by Kennecott for conducting air sampling.

Air monitoring samples may be collected at excavation zones, along haul roads, at the repository, and from selected personnel to monitor for airborne emissions during project activities. Quantitative air sampling is conducted using battery-powered personal sampling pumps. These pumps draw air through sampling media that is then analyzed for the constituents of concern. This air sampling is used to monitor employee exposures and work zone boundaries.

1.1 Purpose

The purpose of air monitoring is to:

- Document employee exposure, if any
- Assist in the selection of personal protective equipment
- Document work-zone emissions
- Evaluate the effectiveness of engineering controls

1.2 Objectives

The Air Monitoring Plan is designed to identify, evaluate, and control the generation of harmful airborne contaminants. Engineering controls and work practices will be adjusted as necessary according to the results of the air monitoring.

2.0 AIR SAMPLING

Air sampling will be governed by National Institute for Occupational Safety and Health (NIOSH) methods and Occupational Safety and Health Administration (OSHA) standards (29CFR, Part 1910). Quantitative air samples will generally be analyzed for total suspended particulates (TSP or airborne dust), arsenic, cadmium, lead, and selenium. Other constituents may be added as necessary to the analyte list, depending on the specific materials expected to be encountered during the work. Table 1 lists the potential contaminants to be monitored, along with the associated Action Level (AL) and Permissible Exposure Level (PEL). If it is determined to be necessary to monitor constituents which are not included in Table 1, appropriate AL and PEL shall be determined on a case by case basis.

Table 1
Limits for Air Contaminants

Air Contaminant	Action Level (AL) [µg/m³]	Permissible Exposure Level (PEL) [µg/m³]	Standard 29CFR1910
Total Dust (TSP)	7,500	15,000	Table Z-3
Arsenic (As)	5	10	1018
Lead (Pb)	30	50	1025
Cadmium (Cd)	2.5	5	1027
Selenium (Se)	100	200	Table Z-1

Units: µg/m³ unless otherwise indicated

Standards are listed as an 8-hour time weighted average

The action level is set at one-half the PEL unless otherwise specified in the standard. The detection of concentrations at or above the action level will result in the institution of engineering controls or other measures to reduce the risk of employee exposure (Section 5.0). All quantitative samples will be handled under chain-of-custody procedures and delivered to a qualified laboratory to be analyzed according to the appropriate NIOSH and OSHA methods. Spontaneous, real-time data may also be collected. Quantitative (personnel and work zone) sampling, and qualitative (real-time) sampling methods are described in Sections 2.3 and 2.4, respectively.

2.1 Standard Operating Procedures

The following standard operating procedure (SOP) will be followed for all quantitative sampling conducted:

1. Fill out electronic monitoring log header at the beginning of the day;
2. Calibrate sampling pumps and record information in the field log;
3. Connect filter cassette to pump, remove the inlet plug from filter cassette, turn pump on, and place pump on person or in area to be monitored;
4. Document initial information about the individual samples and conditions in a field log, including pump number, cassette number, start times, locations and/or personnel, maps or diagrams (when necessary), and any field conditions relevant to air sampling;
5. Ensure required quality assurance sample (1 field blank or trip blank per 10 samples) is prepared;
6. At days end, turn off pumps, record stop time in field log, and plug cassettes;
7. Re-calibrate pumps and record information in the field log;
8. Place the pumps on charge overnight;
9. Prepare chain-of-custody forms for any samples to be submitted for laboratory analysis; and
10. Either package and ship/submit samples to the laboratory with proper chain-of-custody forms; or securely store the samples for future submittal.

2.2 Background Air Sampling

Background air samples will be collected prior to any soils removal activities. Data will be collected using hi-flow (1.0 to 2.0 L/min) or hi-volume (up to 20.0 L/min) samples. Previously collected data may also serve as background data. The availability and usability of historical background data will be evaluated on a case-by-case basis. Historical and site assessment data will be used to determine what parameters will be sampled. The background samples will be used to determine a suitable reference data base for comparison with airborne

constituents measured during the project.

2.3 Quantitative Air Sampling

Work zone air samples will be collected at soil removal work zones and at the repository to determine emission concentrations. The sampling results will document work zone air quality and potential off-site migration of air contaminants. All quantitative air monitoring will be conducted following NIOSH methodologies. Personal monitoring will be performed with battery powered 2 L/min sampling pumps that draw air through sampling media. Most samples will be collected using 37 millimeter cassettes containing pre-weighted 0.8 μm filters. The sampling results will document the air quality of immediate work areas and potential worker exposures.

2.4 Qualitative Air Sampling

Area wide pumps, Miniram monitors or detector tubes may be used to qualitatively measure personnel exposures, and work zone and perimeter emissions. The Miniram is a nephelometer which measures the light-scattering effect of particulates and gives an estimated, digital representation of the respirable dust concentration (PM₁₀) of an area. If needed, this instrument will be placed in the field with an area wide (high-volume ≥ 10 L/min) pump (as a reference), or in locations determined to have the greatest potential for air emissions.

3.0 QUALITY ASSURANCE AND QUALITY CONTROL

The purpose of the Air Sampling Quality Assurance and Quality Control (QA/QC) Program is to assure that data generated during the air monitoring program is accurate and consistent with QA/QC objectives. The quality of the data will be assessed based on accuracy and completeness. Accuracy is a determination of how close the measurement is to the true value and will be assessed by calibration of sampling pumps, cleanliness of field blanks, and laboratory quality control (Sections 3.1, 3.4, and 3.5). Completeness is a measure of the amount of valid data that will be obtained, compared to the amount that is expected under normal conditions. Ninety percent (90%) accuracy and completeness is expected for this Air Monitoring Plan. The project data objectives for accuracy and completeness meet or exceed guidelines established by NIOSH and OSHA.

Quality assurance and quality control procedures for air sampling require the calibration of instruments, the completion of a sampling log, following chain-of-custody procedures, and the use of quality control blanks. Additionally, internal QA/QC audits and laboratory audits will be conducted. The following sections describe each of these QA/QC procedures.

3.1 Instrument Calibration

Air sampling pump flow will be calibrated following NIOSH protocol. The pumps will be calibrated on a quarterly basis using a primary standard calibration device such as an SKC UltraFlow Bubble Meter (Buck calibrator), a BIOS International DryCal calibrator, or other commercially accepted primary calibration device. The pumps shall be calibrated according to the manufacturers' specific protocol.

Air sampling pumps will also be calibrated at the beginning and end of each sampling day using either a primary device as discussed above, or a secondary device such as a rotameter. If a rotameter is used, it must be calibrated against a primary standard and a calibration curve developed between the two standards. The cassette used for pre-calibration will also be used for post-calibration. The post-calibration must be within $\pm 5\%$ of the pre-calibration or that particular sample will be voided.

3.2 Air Sampling Documentation

Quality assurance and quality control procedures for air sampling require that relevant information be recorded in an electronic field monitoring log. The log will be maintained by project personnel during all sampling activities.

The general information recorded for each day's sampling includes:

- Header
 - Date
 - Job or specific task name
 - Sampling personnel
 - Weather conditions
- Pump number
- Pump flow rate
- Location of sample or name of person wearing pump
- Start/stop and total time of sample
- Volume of air pumped through sample media (in liters)
- Sample name (cassette serial number for pre-weighed filters)
- Constituents selected for analysis
- Site engineering controls and PPE worn by workers
- Any field observations/work activities relevant to air sampling and maps or diagrams as necessary

Significant deviations from sampling protocol shall be formally noted in the sample log, along with visiting personnel and any unusual circumstances which might affect the sampling.

3.3 Chain-of-Custody

To establish the documentation necessary to trace sample possession from the time of collection through analysis, a chain-of-custody record will be filled out and will accompany every set of samples to the laboratory. The record will include the following for each sample:

- Name of sampler
- The project name
- Sample collection date
- Sample number
- Filter cassette number (serial number if cassettes are pre-weighed)
- Analysis request
- Volume of air pumped
- Signature of the collector
- Signature of person(s) involved in the chain of possession
- Time and date of change of possession

To prevent sample misidentification, each sample cassette is affixed with a label which includes the following information:

- Sample date
- Sample identification number
- Sample cassette number (serial number for pre-weighed filters)

Samples will be packaged in clean containers using material to stabilize the cassettes during shipment, if necessary. Sample packing should be completed in areas that are remote from potential contaminant sources.

In general, not all collected samples are submitted for analysis. After a determination is made as to which samples are to be analyzed, and a sufficient amount of cassettes have been collected, the samples will be delivered or shipped to an analytical laboratory for analysis.

3.4 Quality Control Blanks

Internal quality control checks will be conducted to evaluate the quality of data based on field conditions and constraints. The field QA/QC program will be conducted in addition to laboratory QA/QC. One QC blank should be submitted for every 10 samples (10%). The following QC blanks will be submitted for analysis:

- Field Blank - Opened filter cassette placed near an active sample, but not attached to a sampling pump. When the nearby active sample is closed at the end of the testing period, the blank cassette is also closed and returned to the lab with the other samples as a test for contamination during sampling and/or transport.
- Trip Blank - Unopened cassette that is subject to the same handling as sampled cassettes. The trip blank is returned to the lab as a test for contamination of the filter prior to receiving the cassette from the lab and/or during analysis.

The above internal QC samples will be evaluated to determine if sampling and analysis procedures are adequate to provide valid analytical data. The presence of contamination in blanks would indicate the need for review of field and/or laboratory procedures.

3.5 Quality Control Audits

Quality control system audits will be conducted monthly by a designated QA/QC Officer as an internal check on all components of the monitoring procedures including field and laboratory methods. The purpose of the audit is to:

- Identify and correct reporting errors
- Ensure that quality data will be reported
- Determine if a sufficient amount of air sampling is being performed in accordance with applicable regulations

If audits detect conditions or data that do not meet project requirements, corrective action will be initiated. The nature of the action will depend on the circumstances of each situation and may include evaluating and amending sampling and analytical procedures, or accepting the data while acknowledging the level of uncertainty.

Any corrective measures taken during the monitoring program will be described in the project reports.

3.6 Quality Assurance Reports to Management

Following review by the QA/QC Officer, final field and laboratory reports will be submitted to the Project Manager at the completion of individual projects. The reports will include the following:

- Total number of samples collected for the month/project
- Total number of samples voided for the month/project

- Total number of blanks for the month/project
- Percent blanks and percent completion for the month/project
- Number of days lost due to weather or other unforeseen circumstances
- Description of project activities

4.0 ANALYTICAL METHODS

The air samples collected using NIOSH methods will generally be analyzed for total suspended particulates (NIOSH Method 0500); and lead, arsenic, cadmium, and selenium (NIOSH Method 7300). Sample volumes must be sufficient to ensure that the detection limit is at or below the AL for each particular analyte. Table 2 lists the required air volume to be pumped to achieve a sufficiently low detection limit.

Table 2
Required Pumped Air Sample Volumes In Relation to Action Levels

Analyte	Action Level	Typical Laboratory Detection Limit	Minimum Required Pumped Sample Volume
	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{sample}$)	(liters)
Arsenic	5	2	400
Cadmium	2.5	1	400
Lead	30	2	70
Selenium	100	2	20
Total Suspended Particulates	7,500	30	4

Other site-specific air contaminants that may be monitored will be analyzed by the appropriate methods at a certified laboratory. The results of all air sampling will be shown to employees involved in work activities at each site within five days of receiving them, which meets or exceeds OSHA regulations. Return time for the sample analysis results is generally ten days to two weeks unless otherwise specified.

5.0 SAMPLING PLAN

Sampling for the subject project shall be completed as follows:

	<u>Location</u>	<u>Filter Match Weight</u>	<u>Volume</u>
1-ea.	Equipment Operator	0.8 μm	2 L/min
1-ea.	Ground Personnel	0.8 μm	2 L/min
1-ea.	Upwind of Excavation	0.8 μm	10 L/min
1-ea.	Downwind of Excavation	0.8 μm	10 L/min

If the Action Level (AL) is achieved, there will be an immediate "Stop Work", and evacuation of the area. Conditions will be reevaluated and work will only resume upon resolution of the condition and the AL is confirmed to be below permissible levels.

6.0 ENGINEERING CONTROLS AND WORK PRACTICES

Site-specific air monitoring programs will be implemented to monitor the effectiveness of engineering controls and work practices used to suppress particulate emissions, and to document worker exposure to airborne physical and chemical hazards. Results from air monitoring will be used to adjust site activities to reduce

particulate generation. Engineering controls previously implemented during Kennecott soil projects include the following:

- Application of water or commercial road treatment on haul roads and excavation areas
- Application of water or dust surfactant on stockpiles and soil reclamation areas
- Washing down of contaminated surfaces

Any additional controls will be initiated as necessary to insure that worker protection will be adequate and to reduce the chance of employee exposure to potentially harmful physical or chemical hazards. The following industrial hygiene procedures shall be followed in conjunction with this Personnel and Work Zone Air Monitoring Plan:

- Wind speeds shall be monitored by use of a hand held anemometer. Work activities shall be discontinued at winds speeds of 25 MPH or greater. Work may resume after one hour of recorded wind speeds below 25 MPH.
- Rubber safety boots or rubber boots over hard toed safety boots shall be used in impacted areas. These boots will remain on site for re-use and will be kept in designated storage.
- Nitrile gloves will be available and required for use in impacted areas when handling soil.
- Sealed waste containers will be at designated areas for disposal of PPE (i.e. gloves).
- Areas for equipment and vehicle decontamination will be designated for cleaning as required for climate conditions. Vehicles and equipment will be inspected and authorized as clean prior to entry on any off site (public or private) road ways.
- Portable bottle eyewash devices will available to all workers. The location and availability will be indicated to all individuals prior to commencement of work.
- As indicated in Section B.10.0 of the HASP, "Eating, drinking, smoking and chewing tobacco or gum are allowed only in designated areas and never in the removal work zone or at the dump site;" Any hand-to-mouth contact is not permitted in any impacted areas.
- Portable handwash stations will be available upon exiting work zones.

Acute or immediate symptoms of a toxic level of exposure to arsenic are referenced in the "NIOSH Pocket Guide to Chemical Hazards". All individuals entering impacted areas will be made aware of signs of potential issues or symptoms. If any of these symptoms are felt, or observed occurring to other workers, an on-site supervisor or health and safety officer is to be notified immediately.

Work practices will vary from site to site, but can include practices such as keeping doors and windows of equipment closed during dusty conditions. Proper usage of personal protective equipment and good personal hygiene will be required during all remediation and reclamation activities.